3000 Operations

3100 Operations Section Organization

Refer to Section 3000 of the Region 9 Regional Contingency Plan.

3110 Organization Options

Refer to Section 3002 of the Region 9 Regional Contingency Plan.

3200 Recovery and Protection

This section will discuss the strategic objectives as well as the general response philosophy, strategies and countermeasures that will be applied by the Unified Command System (UCS) to discharges of oil within the boundaries of the area delineated in section 1000. In addition, the various oil containment, recovery and removal methods available to the UCS will also be discussed along with shoreline cleanup options that could be employed during a spill response.

United States Policy - In the Clean Water Act, Congress declared "... it is the policy of the United States that there should be no discharges of oil or hazardous substance..., and that necessary actions shall be undertaken to remove discharges and eliminate the threat of imminent discharges." This policy is reiterated to serve as a guiding light for the flow of response decisions and allocation of resources. In support of U.S. policy, the paramount response strategy that should be implemented by the Unified Command is to allocate resources to their optimum use; i.e. the most oil recovered, contained, or prevented from being discharged per expenditure of resources. The only variance from this strategy should be considerations of safety and of particularly critical natural (environmentally sensitive) or man-made (economically significant) resources that may demand protection even though manpower and equipment may be deployed elsewhere to more efficiently recover oil. Examples of the latter may include protecting a waterfront area that may be threatened by fire or explosion if impacted, and protecting a municipality's water supply. The priorities of strategic objectives must be carefully considered since they vary from case to case, but generally they are as follows:

Stop the Source: Typically the highest priority. When a damaged vessel(s), shore side facility or pipeline poses a risk of an imminent major discharge, then preventative action to mitigate the size of the spill is the logical first priority, i.e. stabilize and lighter a vessel; contain and secure the shore-based source.

Open Water Containment and Recovery: Once the effort is underway to secure the source, containment and recovery of the spilled oil prior to shoreline impact is the next logical priority. Deploy major recovery vessels, boom-towing vessels and other skimmers to intercept oil before it impacts critical areas or becomes a more costly and environmentally damaging shoreline cleanup problem.

Protection of Sensitive Areas; Depending on the ability to contain and collect spilled oil prior to impact, the protection of resources can compete with containment and collection resources. Priority for protecting these areas is a function of the value of the areas, (as prioritized in section 3610 and 3620) and the feasibility of protecting them. Dedicating open water containment equipment to protecting these areas is not wise if oil that would otherwise have been recovered is merely free to strike other sensitive areas that have not been 'prophylactically' boomed. In general, employ tactics that do not weaken open water recovery operations; deploy resources that are not needed in the open water operations; relocate threatened wildlife by means such as capturing, or scaring with propane noise making cannons and closing off narrow channels with sediment dikes, boom, siphon dams or other natural or man-made materials.

Shoreline Cleanup: Shoreline cleanup should be undertaken only when the risk of recontamination from floating oil passes. Pre-cleaning the beaches of trash and debris prior to the impact of the oil can greatly facilitate the cleanup. The UC must decide if shorelines are going to be cleaned at each tidal change or just once after all the oil anticipated to reach land has come ashore.

The preservation of human life and health shall be the overriding priority for any response to a discharge of oil. There are two elements to this principle; public safety and response personnel safety.

A large release of oil in the vicinity of houseboats, inhabited shoreline areas or at an oil transfer facility could pose a health or explosion hazard, especially if the discharge is in a confined area (e.g. under a dock). Benzene, hydrogen sulfide and other toxic, explosive or oxygen-displacing vapors could be generated. Evacuation of the area, even at the expense of delaying the cleanup, may be necessary until the danger has passed. Evacuation of homes or other public and private facilities, if recommended by the Unified Command (UC), is the responsibility of state and local emergency agencies.

All response personnel must comply with all applicable worker health and safety laws and regulations. Initial response and rescue personnel, who may be underway on self-propelled skimmers and other vessels, and shoreline cleanup personnel could be exposed to health and safety risk(s). Personnel safety is paramount and responders shall comply with the guidelines set forth in OSHA Publication 3172, "Training Marine Oil Spill Response Workers Under OSHA's Hazardous Waste Operations and Emergency Response Standard" located at http://www.osha.gov/Publications/osha3172.pdf and the site safety plan(s) generated by the UCS.

After the threat to personnel safety has been eliminated or reduced to safe levels, response strategies should be implemented to minimize the ecological impact and then the economic and public impact as discussed in the following section.

3210 Protection

In general, protection of the environmentally sensitive areas that could be impacted will receive a higher priority than economically significant sites. This hierarchy was established in the ranking of the environmentally sensitive sites as A, B & C and the economically significant sites as D, E, & F with the highest priority being A (section 3610). However, as mentioned before, resources and sites determined to be critical to the preservation of human health and safety, such as drinking water intakes, power plant intakes and desalinization plants afford first priority, ahead of an environmentally sensitive site.

The Unified Command will make the final decision regarding protection priorities for the environmentally sensitive and economically significant areas. In order to further assist the UC, additional prioritization of equally categorized areas that could be impacted may, in the future, be included in this plan. This will allow the UC to determine which priority sites are to be protected when initial resources will only allow the protection of a few of them.

The UC may utilize the predetermined response strategies for environmentally sensitive sites and economically significant sites. The UC must decide which sites are in jeopardy of being oiled and the response strategy should be implemented as indicated in the response strategy site summary sheets included in section 3610. However, the UC and the responders should remain flexible and be receptive to additional information when instituting the booming plan or other countermeasures. Factors such as unusually high winds, strong tidal currents or freshets, equipment limitations, bottom conditions and the type of oil can have a significant effect on the proposed strategy. Modifications to the preplanned strategies should be expected.

In addition to the seasonal variances, the protection priority of an entire area could foreseeably be changed. For example, if the SSC or a DFG biologist determine that a certain section of marshland or coastline, previously categorized as a lower priority (or not categorized at all), is currently a breeding ground for an endangered species, then protection of that site may be afforded the utmost priority even at the expense of a previously categorized A site located adjacent to it.

3210.1 Containment and Protection Options

Before spilled oil can be effectively recovered, the spreading of the oil must be controlled and the oil contained in an area accessible to oil recovery devices. In this section various oil containment strategies are discussed. Generally, spilled oil is contained using oil containment boom. Typical boom has a flotation section that provides a barrier on and above the water surface and a skirt section that provides a barrier below the water surface. The physical dimensions of the boom to be used for a particular spill will be dependent on local conditions. In the open ocean it may be necessary to use a boom that is several feet tall. In a protected marsh, a boom that is only a few inches tall may be appropriate.

There are limitations on the effectiveness of any boom. Oil will be lost if the conditions are such that there is splash over from breaking waves. Oil will also be carried under the boom if it is deployed in such a way that currents cause the oil to impact the boom with a velocity perpendicular to the boom of greater than 0.7 knots. Once a boom has been deployed, it may be necessary to reposition it due to changing tides and currents. It is desirable to have personnel available to readjust the boom as required. In all cases of boom deployment, consideration must be given to protecting the safety of those involved in the activity.

Open Water Containment: Oil spilled on open water is normally contained using boom. The boom will be deployed using vessels that will tow the boom around the perimeter of the oil spill. The type of boom to be deployed will depend on local conditions, including Sea State, tides, currents and wind. To be most effective, booming on open water must be done as soon as possible after a spill.

Protective Booming: The goal of most oil containment and recovery strategies is to collect the spilled oil from the water and prevent it from reaching sensitive resources. Frequently, however, this is not possible and sensitive resources are oiled in spite of response efforts, especially during large oil spills. Often the goal will be to minimize environmental injury using a variety of booming, containment and recovery techniques. The following are techniques that can be implemented by the Booming Branch of the UCS' Operations section for containing spilled oil on water or as a means to direct it away from sensitive natural resources or cultural amenities. Shoreline cleanup and treatment methods are discussed in more detail in section 4530.

Exclusionary booming is performed prior to the advance of the oil and is used to prevent or exclude oil from entering a harbor inlet, slough, marsh or estuary. Either skirted or sorbent boom can be used for this type of booming. Factors that need to be considered are: type and size of boom, natural outflow of the body of water, wind, tide and currents or a combination of both. These factors can be predetermined by establishment of a priority system, training and local knowledge of underwater topography, weather conditions and boom anchoring capabilities. It is important to remember that the boom needs to be tended and monitored as weather and tidal conditions can change.

Diversionary booming should be set so that oil movement is reduced to under 0.7 knots. This can be accomplished by angling the boom in relation to the current's direction, reducing the velocity of the floating oil in relation to the boom. Diversionary or deflection booms can be set up in series along a waterway to increase their effectiveness. As stated before, the boom(s) needs to be tended and monitored as weather and tidal conditions can change.

Containment booming is used to prevent spreading and to concentrate the oil so it can be skimmed or vacuumed. Factors that need to be considered are: type and size of boom required for weather, winds, tides and currents in the vicinity of potential spill areas; the type of deployment vessel needed; the amount of boom needed for effective containment and available skimming capabilities. Fixed or natural anchor points should be selected. These factors can be predetermined by emphasizing worst case spill scenarios and using local knowledge of weather and sea conditions.

Sorbent booming is useful when the amount of oil is minimal, when tides and currents are light, or when shorelines require protection. Heavier oil can be recovered using adsorbents (oil "sticks" to material) and lighter fuels generally are recovered using absorbents (sausage, sweep, or diapers). Sorbent booming can also be used as a backup for other types of booming to recover product that may have entrained past the primary barrier.

Factors that need to be considered are wind and wave action; type of sorbent required, i.e., rocky or sandy shoreline, marsh area, etc.; and type and viscosity of product to be recovered.

Berms and Dams: Coastal shores are barriers to spreading oil. Temporary berms, dikes and dams can also serve as effective barriers against oil contamination of sensitive natural resources and economic amenities. Berms, dikes and dams are simply another form of booming and are subject to the same environmental stresses. The appropriate protection technique for a particular shore depends on several factors:

Water body type (open water, bay, tidal channel, inlet)

Water current velocity

Water depth

Wave height

Shore type (sand, gravel, boulder)

Generally, sediment berms, dikes and dams will most often be used to protect small coastal inlets or perhaps tidal channels serving wetlands and marshes when these channels are accessible. The object of berms, dikes and dams is to keep oil outside an inlet because there are often abundant natural resources and economically significant areas that use the sheltered waters of bays and estuaries within. Occasionally, dikes and dams have been used across a channel to contain the oil within a portion of marsh in order to prevent widespread contamination of other resources.

Dikes and dams are not practical when currents are great, waters are deep and waves are large. Also, beaches with abundant sand are generally the most suitable for building dikes and dams. Berms can be built above the active beach face to prevent oil contamination of high beach during spring tides. Alternative strategies should be prepared and the necessary supplies and equipment in place should a berm, dike, or dam fail.

3210.11 Near Spill Containment and Recovery

The most effective strategy to aid oil collection and removal is containment. All oil removal and recovery techniques are most effective where oil is thickest. Typically, this is at or near the release site. The most effective use of resources is to insure containment at the primary release site. This must include surrounding the release site with impervious oil barriers including multiple layers of boom as necessary. As oil escapes containment it becomes increasingly difficult to recover and recovery success diminishes rapidly.

Inevitable oil escapes containment, and additional measures must be included to deal with oil escaping containment. This is particularly a necessary where oil booming is subject to winds and waves or strong currents (which includes most sites along the open coast and in San Francisco and Humboldt Bays): oil entrains or is splashed over boom. To counter oil escapement, deployments should include preplanning to anticipate and control escapement. Two measures must be incorporated.

First, configure containment booms to focus and limit any oil escapement to preplanned points along the boom perimeter, for both the ebb and flood tides; these points should be selected to optimize recovery of any escaping oil. A skimmer should then be positioned just downstream from these locations where it can continue skimming escaping oil throughout the 24 hour tide cycle regardless of light or weather conditions. This is very practical in bay conditions where both boom and skimmers can be positioned by anchoring. In open ocean conditions it is more difficult to implement.

Second, employ secondary booming in the spill area. This strategy is most effective in the near shore areas typical in bays, though opportunities may occur in open water to slow spread from the primary containment area. In bays, spill locations are often near shorelines. Shorelines act as containment since they prevent free movement of oil. Also, winds and tides often drive oil toward the shore. Once oil is ashore or in a low current area, contain and recover it there, if possible, to minimize its movement and contamination of other locales. Wherever possible every attempt should be made to contain and collect oil along shorelines that are already oiled. Shores, which have already been impacted, can no longer be protected; therefore, use them as containment and recovery sites. The objective then changes from protection to containment and preventing oil escape to unoiled areas.

If the oil moves from a near shore spill site to open water, the recovery potential will diminish dramatically. As with primary containment, escapement secondary containment booms is predictable and skimmers should be positioned to capture oil throughout the day and night, particularly during the ebb tide. These secondary shoreline confinement strategies should always be reviewed with the Resources at Risk Specialist.

Shoreline Collection: There are predictable locales where recovery efforts can be optimized at shorelines. Since oil re-accumulates, there are two situations where oil collection should be vigorously attempted at the shoreline: 1. Places where oil naturally collects at the shoreline because of winds and currents and 2. Diversion and capture of oil as it flows past or along shorelines and points with low environmental sensitivities.

(The reason oil recollects, is that oil is a substance that spreads primarily in two dimensions on the water surface while water moves in three dimensions; oil will spread and thin but, it will also re-accumulates at predictable locales. It will accumulate wherever water has downward currents, such as tide rips along mud flats, and at windward coves.)

Natural collection points for debris are on all shorelines. These points are so predictable that it is very difficult to keep oil off even with pre-deployments. An alternative is to anticipate such collections and leverage the opportunity for oil capture. This entails developing the site for collection while limiting and focusing undesirable impacts to the habitat. Though this entails risk, the trade-off is likely to be nominal since the impacts are virtually inevitable.

Diversions to shores with low environmental sensitivities are a desirable alternative to unmitigated spread. As described above, oil spreads rapidly on open water and effectual on-water skimming is difficult in a high current environment. Diversion can shunt oil out of the high current and into quiet water capture points at shore. It can be an effective addition to on-water skimming recovery.

Here are the operational considerations when establishing a shoreline collection site when oil is moving along or near shore. Boom sound is positioned at an acute angle to the current to move oil toward the shore collection. Cascading boom arrangements may be necessary. Once oil is at the shoreline, it may be necessary to deploy additional boom to trap the accumulated oil at the shore collection site when the tide reverses. Good land accessibility is important part of selecting capture sites since it permits site support and easy removal of collected oil. Though some natural collection sites may have poor land access, they may be important accumulation points that can be exploited effectively via water.

Deployments of this type should be made only per recommendation of the ACP, Incident Action Plan or with the direction of the Resources at Risk Specialist and the Unified Command.

3220 On-Water Recovery

Oil spilled in open water spreads quickly and weathers rapidly. Often, rough wind and sea conditions will be contributing factors to the cause of the spill and these same conditions will preclude response and deployment of surface equipment or minimize their effectiveness. Such conditions may cause the oil to be dispersed in the water column, evaporated into the atmosphere, and/or transported away from sensitive areas and resources. These conditions may prescribe a decreased response with an action plan that allows a natural “weathering and cleansing” process. If possible, however, an active response must be undertaken in order to remove oil from the environment and thereby reduce the threat to sensitive natural resources.

Usually a series of successive strategies are necessary and appropriate for any spill. Each set of environment and situational conditions limit the array of possible useful strategies. Omission of any appropriate strategy can have severe results. So, it is very important that every effort be given to implementation of the strategies described.

Mechanical control and recovery countermeasures are most effective immediately after a spill when the oil is in a thick layer, and covers a small area. When oil is spilled in or allowed to escape to open water, the possibility of containment and recovery is at the mercy of the weather and sea conditions. Booms and skimmers are most effective in calm waters but can work during moderate weather and sea conditions. When the open water is rough, booms and skimmers be come ineffective and containment by become impossible. Rough conditions speed the rate of spreading, resulting in diminishing opportunity for open water recovery However, when the ocean is rough, booms and skimmers become ineffective.

In bays like San Francisco and Humboldt, tidal mixing is so dramatic that once oil reaches open water, which is under strong tidal influence, a spill in any amount will rapidly spread throughout the bay. This rapid spread reduces on-water collection effectiveness. Also, as oil spreads it threatens and impacts an increasingly wider number of resources and sensitive sites.

The On Water Recovery Branch - On-Water recovery is in the Operations Section of the Unified Command System. The On-Water Recovery Branch reports to the Operations Section Chief. Major responsibilities are as follows:

Implement assigned portion of spill action plan to contain and recover spilled oil.

Request needed resources and assign to group supervisors.

Maintain ship to shore communications.

Provide situation and resource status information to the Operations Section

Coordinate activities with Shoreline Cleanup and Booming Branches

Report all events and accidents to the Operations Section Chief.

Evaluate the performance of containment and recovery equipment.

Participate in strategy development with Planning and Logistics Sections.

3220.1 Recovery Options

3220.11 Offshore/Open Water Operations

Oil removal/recovery in open water is accomplished through the use of skimming devices once the oil has been contained. Skimmers can be freestanding in which the skimmer is a separate piece of equipment which pumps the oil-water mixture from the contained surface into tanks on a vessel. These skimmers are usually driven by hydraulic units on board a vessel. Self-propelled skimmers have a skimmer as an integral part of the vessel. The skimming vessel positions itself at the head of a concentrated or contained pool of oil and recovers the oil into tanks on board the vessel. There is also a type of skimmer in which the weir or collection zone of the skimmer is an integral part of the boom that is in contact with the oil. The pumping and oil collection is done on the vessel that is close to the weir skimmer.

“Vessels of opportunity”, such as fishing vessels, may be used to deploy or tow boom and, depending on their size, be equipped with skimming equipment. They need to have adequate deck space and lifting cranes to carry the necessary equipment. The Coast Guard’s Vessel of Opportunity Skimming System (VOSS) could be deployed on a variety of vessels.

To be most effective, oil spill recovery equipment must be directed to the location of the thickest oil accumulation. Observers on vessels at water level are unable to see a vast area and are unable to recognize the most optimum skimming locations. Skimming activities are best directed by trained observers aloft in helicopters. One observer may be able to direct several skimming units to optimum skimming locations. During hours of darkness or poor visibility, tracking devices that emit radiolocation signals can be placed in the spilled oil to trace the oil movement. Remote sensing systems have been developed which can track oil movement even in darkness and poor visibility. The sensor is mounted in an aircraft that overflies the spill area. The sensor systems include Side Looking Airborne Radar (SLAR), infrared and radiometric.

3220.12 Nearshore/Shallow Water

Oil recovery techniques and equipment are different in near-shore/shallow water locations than open water. Shallow draft vessels and smaller boom and skimmers are used in these situations. These vessels can maneuver into tight places behind and under wharves or in sloughs and can actually skim next to shore in many near-shore locations.

Strategies for near-shore cleanup can differ depending on the depth of the water and the location. Near-shore operations, within a bay or inlet, will also require shallow draft vessels, work boats and skimmers. However, the vessels may only be operable at high tide. At or near low tide, the operation may evolve into a shoreline cleanup operation. Any boom towing boats or skimmers must be able to withstand going aground without sustaining major damage.

Coastal shallow water or near-shore strategies will differ in certain respects. In addition to the need for small, shallow draft vessels, specialized vessels such as kelp cutters and harvesters may also be needed. California's rocky coast can make near-shore operations difficult and even dangerous during high surf and winter conditions. Once again, the safety of personnel involved in these operations is the Unified Command's paramount concern.

Weir Skimmers: These skimmers recover oil by aligning a barrier just below the surface of the water and having oil floating on the water surface pass over the weir into a recovery box or into a pump. Weir skimmers are not the most efficient recovery systems because a large amount of water is usually collected along with the recovered oil.

Vortex Skimmers: In a vortex skimmer, a turbine-like fan, mounted below the surface, is used to create a current that draws in oil floating on the water. It is then pumped to a collection tank. The device is mounted on a vessel or floats at the water surface.

Sorption/Oleophilic Skimmers: This type of skimmer uses materials that will retain a high percentage of oil minimizing the amount of water collected with the oil. The skimming devices can be belts, ropes, brushes or discs that come in contact with the oil. The device then will either wring or scrape the oil from the material into a collection point for removal to a storage tank.

Suction Skimmers: These devices operate in conjunction with a pump that draws liquid into the skimming device. The skimmer head generally floats on the water with an oil/water mixture being drawn into the skimmer. A typical application would include a skim head used with a truck mounted vacuum system.

Suction dredges are rarely used to recover oil or oiled sediments from the bottom of a water body because oil usually does not sink or, if it does, the amount is small and not recoverable. There are exceptions, however. Whether an oil sinks or floats depends primarily on the specific gravity of the oil and the temperature and salinity of the water. Oil may also sink once it is adsorbed to exposed sediment like sand or gravel, which is subsequently mobilized and redeposited in deeper water.

If dredging is considered as a recovery technique, there must be provision for containment and storage of large quantities of water recovered along with the oil or oiled sediment. A large quantity of oil contaminated water can present significant storage, transport, and disposal problems which must be resolved before the activity is begun. These problems can be diminished if oil/water separation is provided, and state and federal agencies allow decanting of water back to the containment area.

Dredging can be coupled with low-volume, low pressure washing of the bottom to direct the sunken oil down-gradient to some collection point where a dredge can recover the accumulated oil. Currents and flow patterns may cause the sunken oil to naturally collect in low spots that can serve this same purpose. The use of a hopper barge's inverted draghead as a weir skimmer was fairly successful in Prince William Sound and could be employed in calm seas.

Vacuum trucks are frequently essential equipment for cleanup of oil spills. A hose is extended from the truck to the oil collection or containment site to pick up the oil. If the oil is floating on water, the suction hose can be connected to a "duck bill" nozzle that has a long horizontal slot to allow the oil to be picked up while minimizing the amount of water collected. A weir-type skimmer can also be connected to the suction hose to suck the thin layer of oil from the surface and minimize the amount of water collected at the same time. Both methods require a full-time attendant to adjust the equipment and clear debris.

Vacuum trucks work best when the oil layer is thick. If there is only a thin layer of oil on the water, much more water will be collected than oil. Recovery of a large quantity of water can make a vacuum truck operation very inefficient because the tank will quickly fill with water and little oil. Transport and disposal costs increase as a result. The operation can be made more efficient if the oil/water mix recovered is allowed to separate in the tank and the water decanted back to the containment area. Decanting can be approved by the UC according to state law.

3220.2 rage

3230 Shoreside Recovery

Shoreline Types

The most obvious differences between shorelines along the California coast are due to their geomorphology. These geomorphological differences are caused by their exposure to different quantities of water and wind driven forces of shoreline energy (specifically waves and currents) and the shoreline type (substrate, grain size, tidal elevation, origin). The geomorphology and the degree of exposure to waves and currents combine to influence the plants and animals that inhabit the intertidal and shallow subtidal areas of the shoreline and the natural persistence of stranded oil. It is these same factors that provide the criteria to determine the appropriate shoreline cleanup techniques.

These concepts were the basis for development of the Environmental Sensitivity Index (ESI) by the Research Planning Institute (RPI), which ranks shorelines according to their sensitivity to oiling and shoreline cleanup activity. The ESI provides a useful first step in the design of contingency plans because it enables the ready identification of priority areas for protection from oiling and determination of appropriate shoreline cleanup methods during response activities. Summarized, the ESI ranges from 1 (least sensitive to oil) to 10 (most sensitive to oil). Detailed descriptions of the ESI shoreline types and likely oil impacts can be found in the National Oceanic & Atmospheric Administration (NOAA) Shoreline Assessment Manual at:
http://response.restoration.noaa.gov/shor_aid/shor_aid.html

Shoreline types are ranked as follows:

RANK	SHORE	(NOAA ESI Map Shore Type
1	Exposed Rocky Shores	(1a)

2	Exposed Solid Man-made Structures	(1b)
3	Exposed Wave-cut Platforms	(2a)
4	Sand Beaches	(3&4)
5	Mixed Sand and Gravel Beaches	(5)
6	Gravel Beaches	(6a)
7	Riprap	(6b)
8	Exposed Tidal Flats	(7)
9	Sheltered Rocky Shores	(8a)
10	Sheltered Solid Man-made Structures	(8b)
11	Sheltered Tidal Flats	(9a)
12	Salt to Brackish Marshes	(10a)

3230.1 Shoreline Cleanup Options

Shoreline Cleanup:

Under certain conditions it will be appropriate to take actions to remediate the effects of stranded oil on shorelines. Other conditions may dictate that no actions should be taken. The primary goal of the implementation of any shoreline countermeasure is the removal of oil from the environment with no further injury or destruction to that environment. A list of the 21 different countermeasures is provided. These 21 countermeasures, including natural recovery, have been evaluated for the appropriateness of their use on five different major categories of petroleum products (very light, light, medium, heavy, non-floating) stranded on ten shoreline types. The results of these evaluations are presented on five matrices attached at the end of this section. These matrices are intended to be used as a planning guide by the Shoreside Recovery Group of the Operations Section.

The countermeasures listed may not be the best for use under all possible circumstances, and multiple countermeasures may need to be used on the same shoreline. Selection of specific countermeasures for use during a spill response will be based on the properties off the stranded oil, the degree of contamination, the shoreline type, and the presence of sensitive natural resources. The Federal On-Scene Coordinator or the State On-Scene Commander has the authority to select or approve specific countermeasures for use during an oil spill response.

Potential Shoreline Treatment Methods:

The following section lists and describes those techniques, which may be required for use during a shoreline cleanup. Methods and equipment currently in use for these shoreline treatment methods are described in more detail in the Shoreline Assessment Manual. These methods, when used according to the guidelines in this document, may be used on most sites as part of the UC-directed response. It should be noted that methods noted with an (*) will require special consideration and authorization by the natural resource trustee prior to commencement of work. The trustee agency(s) for fish and wildlife resources will make the final recommendations to the Unified Command on which specific method(s) to employ on a case-by-case basis. Regardless of this decision, contingency plans should provide for an array of identified methods to be used. Currently approved methods are:

Natural Recovery

Barriers/Berms

Manual Oil Removal/Cleaning

Mechanical Oil Removal

Sorbents

Vacuum

Debris Removal

Sediment Reworking/Tilling

Vegetation Cutting/Removal

Flooding (deluge)

Low Pressure, Ambient Water Flush (<50 psi)

High Pressure, Ambient Water Flush (50-100 psi)

Low Pressure, Hot Water (<50 psi)

High Pressure, Hot Water (50-100 psi)

Steam Cleaning

Sand Blasting

Solidifiers

Shoreline Cleaning Agents

Nutrient Enrichments

Natural Microbe Seeding

In-situ Burning

A description of each shoreline cleanup method is discussed below:

3230.11 Natural Recovery

Objective: No attempt is made to remove any stranded oil, when there is no effective method for cleanup or to minimize impact to the environment. Oil is left to degrade naturally.

Description: No action is taken, although monitoring of contaminated areas is required.

Applicable Habitat Types: All habitat types.

When to Use: When natural removal rates are fast (e.g., gasoline evaporation or high energy coastlines), when the degree of oiling is light, access is severely restricted or dangerous to cleanup crews, or when cleanup actions will do more harm than natural removal.

Biological Constraints: This method may be inappropriate for areas used by high numbers of mobile animals (birds, marine mammals) or endangered species.

Environmental Effects: Same as from the oil alone.

Waste Generation: None.

3230.12 Barriers/Berms

Objective: To prevent entry of oil into a sensitive area or to divert oil to a collection area.

Description: A physical barrier other than a boom is placed across an area to prevent oil from passing through into sensitive habitats. Barriers can consist of earthen berms or filter fences. When it is necessary for water to pass because of water volume, underflow or overflow dams are used.

When to Use: When the oil threatens sensitive habitats, and other barriers are not feasible. To protect sensitive areas when cleaning adjacent shorelines.

Applicable Habitat Types: At the mouths of creeks or streams to prevent oil from entering from offshore, or to prevent oil from being released from the creek into offshore waters. Also, on beaches where a high berm can be built above the high-tide line to prevent oil from over-washing the beach and entering a sensitive back-beach habitat (e.g. lagoon).

Environmental Effects: May disrupt or contaminate sediments and adjacent vegetation. The natural beach or shore profile should be restored (may take weeks to months on gravel beaches).

Biological Constraints: Responders must minimize disturbance to sensitive areas, such as shorebird nesting sites on beaches. Placement of dams and filter fences could cause excessive physical disruptions to the site, particularly in wetlands.

Waste Generation: Sediment barriers will become contaminated on the oil side and filter fence materials will have to be disposed of as oily wastes.

3230.13 Manual Oil Removal/Cleaning

Objective: To remove oil with hand tools and manual labor.

Description: Removal of surface oil with hands, rakes, shovels, buckets, scrappers, sorbents, pitchforks, etc., and placing in containers. No mechanized equipment is used. Includes underwater recovery of submerged oil by divers with hand tools, for example.

Applicable Habitat Types: Can be used on all habitat types.

When to Use: Light to moderate oiling conditions for stranded oil or heavy oils that have formed semi-solid to solid masses that can be picked up manually.

Biological Constraints: Foot traffic over sensitive areas (wetlands, tidal pools, etc.) should be restricted or prevented. There may be periods when shoreline access should be avoided, such as during bird nesting.

Environmental Effects: Minimal, if surface disturbance by crew movement and waste generation is controlled.

Waste Generation: May generate significant quantities of oil mixed with sediment, which must be properly disposed of or treated. Decontamination of hand tools may produce oily wastewater that must be treated properly. Worker personal protective gear is usually disposed of daily or decontaminated and the resulting oily wastewater treated properly.

3230.14 Mechanical Oil Removal

Objective: To remove oil from shorelines and bottom sediments with mechanical equipment.

Description: Oil and oiled sediments are collected and removed using mechanical equipment such as backhoes, graders, bulldozers, dredges, draglines, etc. Requires systems for temporary storage, transportation, and final treatment and disposal.

Applicable Habitat Types: On land, wherever surface sediments are both amenable to and accessible to heavy equipment. For submerged oil, used in sheltered areas where oil accumulates. On water, used on viscous to solid oil.

When to Use: When large amounts of oiled materials must be removed. Care should be taken to remove sediments only to the depth of oil penetration, which can be difficult when using heavy equipment. Should be used carefully where excessive sediment removal may cause erosion.

Biological Constraints: Heavy equipment may be restricted in sensitive habitats (e.g., wetlands, soft sub-strate) or areas containing endangered species. Will need special permission to use in areas with known cultural resources. Dredging in seagrass beds or coral reef habitats may be prohibited. The noise generated by the mechanical equipment may also be a constraint.

Environmental Effects: The equipment is heavy, with many support personnel required. May be detrimental if excessive sediments are removed without replacement. All organisms in the sediments will be affected, although the need to remove the oil may make this response method the best overall alternative. Resuspension of exposed oil and fine-grained oily sediments can affect adjacent bodies of water.

Waste Generation: Can generate significant quantities of contaminated sediment that must be cleaned or landfilled. The amount of waste generated by this cleanup option should be given careful consideration by response planners when reviewing potential environmental impacts of the oily wastes, debris, and residues.

3230.15 Sorbents

Objective: To remove surface oil by absorption onto oleophilic (oil-attracting) material placed in water or at the waterline.

Description: Sorbent material is placed *on the floating oil or water surface* to allow it to sorb oil, or alternatively, the material can be used to wipe or dab stranded oil. Forms include sausage boom, pads, rolls, sweeps, snares, and loose granules or particles. These products can be either synthetic or natural substances. Efficacy depends on the capacity of the particular sorbent, energy available for lifting oil off the substrate, and stickiness of the oil. Recovery of all sorbent material is mandatory. Loose particulate sorbents must be contained in a mesh or other material.

Applicable Habitat Types: Can be used on any habitat or environment type.

When to Use: When oil is free-floating close to shore or stranded on shore. The oil must be able to be released from the substrate and absorbed by the sorbent. Often used as a secondary treatment method after gross oil removal and in sensitive areas where access is restricted. Selection of sorbent varies by oil type; heavy oils only coat surfaces, requiring a high surface area to be effective, whereas lighter oils can penetrate sorbent material.

Biological Constraints: Access for deploying and retrieving sorbents should not be through soft or sensitive habitats or affect wildlife. Sorbent use should be monitored to prevent overuse and generation of large volumes of waste. Sorbents should not be used in a fashion that would endanger or trap wildlife. Sorbents left in place too long can break apart and present an ingestion hazard to wildlife.

Environmental Effects: Physical disturbance of habitat during deployment and retrieval. Improperly deployed or tended sorbent material can crush or smother sensitive substrates.

Waste Generation: Sorbents must eventually be collected for proper disposal so care should be taken to select and use sorbents properly, and prevent generation of large amounts of lightly-oiled sorbents. Recycling should be emphasized rather than disposal.

3230.16 Vacuum

Objective: To remove oil pooled on a shoreline substrate or subtidal sediments.

Description: A vacuum unit is attached via a flexible hose to a suction head that recovers free oil. The equipment can range from small, portable units that fill individual 55-gallon drums to large supersuckers that are truck or vessel-mounted and can generate enough suction to lift large rocks. Removal rates from substrates can be extremely slow.

Applicable Habitat Types: Any accessible habitat type. May be mounted on barges for water-based operations, on trucks driven to the recovery area, or hand-carried to remote sites.

When to Use: When oil is stranded on the substrate, concentrated in trenches or trapped in vegetation. Usually requires shoreline access points.

Biological Constraints: Special restrictions should be established for areas where foot traffic and equipment operation may be damaging, such as soft substrates. Operations in wetlands need to be very closely monitored, with a site-specific list of restrictions developed to prevent damage to vegetation.

Environmental Effects: Minimal, if foot and vehicular traffic is controlled and minimal substrate is damaged or removed.

Waste Generation: Collected oil and or oil/water mix will need to be stored temporarily prior to recycling or disposal. Oil may be recyclable; if not, it will require proper disposal. Large amounts of water are often recovered, requiring separation and treatment.

3230.17 Debris Removal

Objective: To remove contaminated debris from the shoreline or water surface.

Description: Manual or mechanical removal of debris from the shore or water surface. Can include cutting and removal of oiled logs.

Applicable Habitat Types: Can be used on any habitat or environment type where access is safe.

When to Use: When driftwood and debris are heavily contaminated and provide a potential source of chronic oil release. When it may create aesthetic problems, be a source of contamination for other resources in the area, cause clogging problems in the skimmer, or create safety problems for responders. Used in areas of debris accumulation on beaches prior to oiling to minimize the amount of oiled debris to be handled.

Biological Constraints: Foot traffic over sensitive areas (wetlands, spawning grounds) needs to be restricted. May be periods when access should be restricted (spawning periods, influx of large numbers of migratory waterbirds).

Environmental Effects: Physical disruption of substrate, especially when mechanized equipment must be deployed to recover a large quantity of debris.

Waste Generation: Will generate contaminated debris (volume depends on what, and how much, is collected, e.g., logs, brush). Unless there is an approved hazardous waste incinerator that will take oily debris, burning will seldom be allowed especially on-site burning. However, this option should still be explored, especially for remote locations, with the appropriate state or federal agencies that must give approvals for burning.

3230.18 Sediment Reworking/Tilling

Objective: To enhance the rate of degradation, by breaking up oily sediments and surface oil deposits, increasing the surface area, and mixing deep subsurface oil layers to the surface.

Description: The oiled sediments are roto-tilled, disked, or otherwise mixed using mechanical equipment or manual tools. Along beaches, oiled sediments may also be pushed to the water's edge (surf washing) to enhance natural cleanup by wave activity. The process may be aided with high-volume flushing of gravel.

Applicable Habitat Types: On any sedimentary substrate that can support mechanical equipment or foot traffic.

When to Use: On sand to gravel beaches with subsurface oil, where sediment removal is not feasible (due to erosion or disposal problems). On sand beaches, where the sediment is stained or lightly oiled, appropriate where oil is stranded above normal high waterline.

Biological Constraints: Avoid use on shores near sensitive wildlife habitat, such as fish-spawning areas or bird-nesting or concentration areas because of the potential for release of oil and oiled sediments into adjacent bodies of water. Should not be used in shellfish beds.

Environmental Effects: Due to the mixing of oil into sediments, this method could further expose organisms that live below the original layer of oil. Repeated mixing over time could delay reestablishing organisms. Refloated oil from treated sites could contaminate adjacent areas.

Waste Generation: None.

3230.19 Vegetation Cutting/Removal

Objective: To remove portions of oiled vegetation or oil trapped in vegetation to prevent oiling of wildlife or secondary oil releases.

Description: Oiled vegetation is cut with weed-wackers, blades, etc., and picked or raked up and bagged for disposal.

Applicable Habitat Types: Habitats composed of vegetation such as wetlands, seagrass beds, and kelp beds.

When to Use: When the risk of oiled vegetation contaminating wildlife is greater than the value of the vegetation that is to be cut, and there is no less-destructive method that removes or reduces the risk to acceptable levels.

Biological Constraints: Operations must be strictly monitored to minimize the degree of root destruction and mixing of oil deeper into the sediments. Access in bird-nesting areas should be restricted during nesting seasons. Cutting only the oiled portions of the plants and leaving roots and as much of the stem aspossible minimizes impact to plants.

Environmental Effects: Vegetation removal will destroy habitat for many animals. Cut areas will have reduced plant growth, and in some instances, plants may be killed. Cutting at the base of the plant stem may allow oil to penetrate into the substrate, causing subsurface contamination. Along exposed sections of shoreline, the vegetation may not recover, resulting in erosion and habitat loss. Trampled areas will recover much more slowly.

Waste Generation: Cut portions of oiled plants must be collected and disposed.

3230.110 Flooding

Objective: To wash oil stranded on the land surface to the water's edge for collection. Description: A perforated header pipe or hose is placed above the oiled shore or bank. Ambient-temperature water is pumped through the header pipe at low pressures and flows downslope to the water. On porous sediments, water flows through the substrate, pushing loose oil ahead of it, or floating oil to the water's surface and transporting the oil down the slope for pickup. On saturated, fine-grained sediments, the technique becomes more of a flushing of the surface.

Applicable Habitat Types: All shoreline types where the equipment can be effectively deployed. This is non-effective in steep intertidal areas.

When to Use: In heavily oiled areas when the oil is still fluid and adheres loosely to the substrate, and where oil has penetrated into gravel sediments. This method is frequently used with other washing techniques (low- or high-pressure, cold-to-hot-water flushing).

Biological Constraints: Special care should be taken to recover oil where nearshore habitats contain rich biological communities. Not appropriate for muddy substrates.

Environmental Effects: Habitat may be physically disturbed by foot traffic during operations and smothered by sediments washed down the slope. Oiled sediment may be transported to shallow, nearshore areas, contaminating them and burying benthic organisms.

Waste Generation: Depends on the effectiveness of the collection method.

3230.111 Low-Pressure, Ambient Water Flushing

Objective: To remove fluid oil that has adhered to the substrate or man-made structures, pooled on the surface, or become trapped in vegetation.

Description: Ambient-temperature water is sprayed at low pressures (<10 psi), usually from hand-held hoses, to lift oil from the substrate and direct it to the water's edge for recovery by skimmers, vacuum, or sorbents. Can be used with a flooding system to prevent released oil from re-adhering to the substrate down-stream of the treatment area.

Applicable Habitat Types: On substrates, riprap, and solid man-made structures, where the oil is still fluid. In wetlands and along vegetated banks where oil is trapped in vegetation.

When to Use: Where fluid oil is stranded onshore or floating on shallow intertidal areas.

Biological Constraints: May need to restrict use so that the oil/water effluent does not drain across Sensitive, intertidal habitats and mobilized sediments do not affect rich subtidal communities. Use from boats will reduce the need for foot traffic in soft substrates and vegetation. Flushed oil must be recovered to prevent further oiling of adjacent areas.

Environmental Effects: If containment methods are not sufficient, oil and oiled sediments may be flushed into offshore areas. Some trampling of substrate and attached biota will occur.

Waste Generation: Depends on the effectiveness of the collection method.

3230.112 High Pressure, Ambient Water Flushing

Objective: To remove oil that has adhered to hard substrates of man-made structures.

Description: Similar to low-pressure flushing except that water pressure is 100-1,000 psi. High-pressure spray will more effectively remove sticky or viscous oils. If low-water volumes are used, sorbents are placed directly below the treatment area to recover oil.

Applicable Habitat Types: On bedrock, man-made structures, and gravel substrates.

When to Use: When low-pressure flushing is not effective at removing adhered oil that must be removed to prevent continued oil release or for aesthetic reasons. When a directed water jet can remove oil from hard-to-reach sites.

Biological Constraints: May have to restrict flushing so that the oil does not drain across sensitive habitats. Flushed oil must be recovered to prevent further oiling of adjacent areas. Attached animals and plants in the direct spray zone will be removed.

Environmental Effects: May drive oil deeper into the substrate or erode shorelines of fine sediments if water jet is improperly applied. If containment methods are not sufficient, oil and oiled sediments may be flushed into offshore areas. Some trampling of substrate and attached biota will occur.

Waste Generation: Depends on the effectiveness of the collection method.

3230.113 Low Pressure, Hot Water Flushing

Objective: To remove non-fluid oil that has adhered to the substrate or man-made structures, or pooled on the surface.

Description: Hot water (90.F up to 170.F) is sprayed with hoses at low pressures (<10 psi) to liquefy and lift oil from the substrate and direct it to the water's edge for recovery by skimmers, vacuums, or sorbents. Used with flooding to prevent released oil from re-adhering to the substrate.

Applicable Habitat Types: On bedrock, sand to gravel substrates, and man-made structures.

When to Use: Where heavy, but relatively fresh oil is stranded onshore. The oil must be heated above its pour point, so it will flow. This is less effective on sticky oils.

Biological Constraints: Avoid wetlands or rich intertidal communities so that hot oil/water effluent does not contact sensitive habitats. Operations from boats will help reduce foot traffic in soft substrates and vegetation. Flushed oil must be recovered to prevent further oiling of adjacent areas.

Environmental Effects: Hot-water contact can kill all attached animals and plants. If containment methods are not sufficient, oil may be flushed into downstream areas. Some trampling of substrate and biota will occur.

Waste Generation: Depends on the effectiveness of the collection method.

3230.114 High Pressure, Hot Water Flushing

Objective: To mobilize weathered and viscous oil strongly adhered to surfaces.

Description: Hot water (90 degrees F [30 degrees C] up to 170 degrees F [70 degrees C]) is sprayed with hand-held wands at pressures greater than 100 psi (720 kpa). If used without water flooding, this procedure requires immediate use of vacuum or sorbents to recover the oil/water runoff. When used with a flooding system, the oil is flushed to the water surface for collection by skimmers, vacuum, or sorbents.

Applicable Habitat Types: Gravel substrates, bedrock, and man-made structures.

When to Use: When oil has weathered to the point that warm water at low pressure no longer effectively removes oil. To remove viscous oil from man-made structures for aesthetic reasons.

Biological Constraints: Use should be restricted so that the oil/water effluent does not drain across sensitive habitats (damage can result from exposure to oil, oiled sediments, and hot water). Should not be used directly on attached algae nor rich, inter-tidal areas. Released oil must be recovered to prevent further oiling of adjacent areas.

Environmental Effects: All attached animals and plants in the direct spray zone will be removed or killed, even when used properly. Oiled sediment may be transported to shallow nearshore areas, contaminating them and burying benthic organisms.

Waste Generation: Depends on the effectiveness of the collection method.

3230.115 Steam Cleaning

Objective: To remove heavy residual oil from solid substrates or man-made structures.

Description: Steam or very hot water (171 degrees F [77 degrees C] to 212 degrees F [100 degrees C]) is sprayed with hand-held wands at high pressure (2000+ psi [14,400 kpa]). Water volumes are very low compared to flushing methods.

Applicable Habitat Types: Man-made structures such as seawalls and riprap.

When to Use: When heavy oil residue must be removed for aesthetic reasons, and when hot-water flushing is not effective and no living resources are present.

Biological Constraints: Not to be used in areas of soft substrates, vegetation, or high biological abundance directly on, or below, the structure.

Environmental Effects: Complete destruction of all organisms in the spray zone. Difficult to recover all released oil.

Waste Generation: Depends on the effectiveness of the collection method. Usually sorbents are used, generating significant waste volumes.

3230.116 Sand Blasting

Objective: To remove heavy residual oil from solid substrates or man-made structures.

Description: Use of sandblasting equipment to remove oil from the substrate. May include recovery of used (oiled) sand in some cases.

Applicable Habitat Types: On heavily oiled bedrock, artificial structures such as seawalls and riprap.

When to Use: When heavy oil residue must be cleaned for aesthetic reasons, and even steam-cleaning is not effective.

Biological Constraints: Not to be used in areas of soft substrate, vegetation, or high biological abundance directly below, or adjacent to, the structures.

Environmental Effects: Complete destruction of all organisms in the blast zone. Possible smothering of downstream organisms. Unrecovered, used sand will introduce oiled sediments into the adjacent habitat.

Waste Generation: Will need to recover and dispose of oiled sand used in blasting.

3230.117 Solidifiers

Objective: To change the physical state of spilled oil from a liquid to a solid.

Description: Chemical agents (polymers) are applied to oil at rates of 10-45 percent or more, solidifying the oil in minutes to hours. Various broadcast systems, such as a leaf blowers, water cannons, or fire suppression systems, can be modified to apply the product over large areas. Can be applied to both floating and stranded oil. Can be placed in booms, pillows, sausages, etc. and used like sorbents, although this type of solidifier application has not been used operationally.

Applicable Habitat Types: All water environments, bedrock, sediments, and artificial structures.

When to Use: When immobilization of the oil is desired, to prevent refloating from a shoreline, penetration into the substrate, or further spreading. However, the oil may not fully solidify unless the product is well mixed with the oil, and may result in a mix of solid and untreated oil. Generally not used on heavy oil spills, which are already viscous.

Biological Constraints: Must be able to recover all treated material.

Environmental Effects: Available products are insoluble and have very low aquatic toxicity. Unrecovered solidified oil may have longer impact because of slow weathering rates. Physical disturbance of habitat is likely during application and recovery.

Waste Generation: If skimming efficiency is increased, solidifiers may reduce the volume of water collected during oil recovery. Effects on recycling oil treated with solidifiers is unknown. Most solidifier producers state that treated oil can pass leachate tests, allowing disposal in landfills.

3230.118 Shoreline Cleaning Agents (Surface Washing Agents)

Objective: To increase the efficiency of oil removal from contaminated substrates.

Description: Special formulations are applied to the substrate, as a presoak and/or flushing solution, to soften or lift weathered or heavy oils from the substrate to enhance flushing methods. The intent is to lower the water temperature and pressure required to mobilize the oil from the substrate during flushing. Some agents will disperse the oil as its washed off the beach, others will not.

Applicable Habitat Types: On any habitat where water flooding and flushing procedures are applicable.

When to Use: When the oil has weathered to the point where it cannot be removed using ambient water temperatures and low pressures. This approach may be most applicable where flushing effectiveness decreases as the oil weathers.

Biological Constraints: When the product does not disperse the oil into the water column, the released oil must be recovered from the water surface. Use may be restricted where suspended sediment concentrations are high, near wetlands, and near sensitive near shore resources.

Environmental Effects: The toxicity and effects on dispersability of treated oil vary widely among products. Selection of a product should consider the toxicity of the product.

Waste Generation: Because treated oil must be recovered, waste generation is a function of recovery method, which often includes sorbents.

3230.119 Nutrient Enrichment (Biostimulation)

Objective: To accelerate the rate of oil hydrocarbon degradation due to natural microbial processes using a form of bioremediation that adds nutrients (generally nitrogen and phosphorus) that stimulate microbial growth. If nutrients are a limiting factor (as measured using the interstitial pore water) in an area where shoreline oiling has occurred, water-soluble nutrients can be applied by a spray irrigation system.

Description: Nutrients should be applied daily if the impacted area gets completely submerged by tides and waves and if maximum biostimulation is desired. If the impacted area gets submerged only during spring tides, the frequency of nutrient addition will be determined by the intertidal zone water coverage. Using slow-release granular or encapsulated nutrients or oleophilic fertilizer (which adheres to the oil residue on the surface) should require less frequent addition, but time-series monitoring of interstitial pore water nutrient levels is needed to ensure target levels are being maintained, especially throughout the depth of the impacted intertidal zone.

When to Use: Any shoreline habitat type where access is allowed and nutrients are deficient.

Applicable Habitat Types: On moderate to heavily oiled substrates, after other techniques have been used to remove free product on lightly-oiled shorelines, where other techniques are destructive or ineffective; and where nutrients limit natural attenuation. Most effective on light to medium crude oils and fuel oils (asphaltenes tend to inhibit rapid biodegradation). Less effective where oil residues are thick. Not considered for gasoline spills, which evaporate rapidly.

Biological Constraints: Avoid using ammonia-based fertilizers at highly elevated concentrations because un-ionized ammonia is toxic to aquatic life. Nitrate is an equally good nitrogen source, minus the toxicity. Sodium tripolyphosphate is a better phosphorus source than orthophosphates because it is more soluble in seawater. If nutrients are applied properly with adequate monitoring, eutrophication should not be a problem. Only nutrient additives proven to be nontoxic and effective in either the laboratory or the field should be used in the environment. Contact toxicity of oleophilic nutrients may restrict their use as other chemicals in the product could be more toxic to aquatic organisms in the presence of oil.

Environmental Effects: Detrimental effects to shoreline from foot or vehicle traffic caused by workers applying nutrients (unless nutrients are sprayed from a vessel or aircraft).

Waste Generation: None.

3230.120 Natural Microbe Seeding (Bioaugmentation)

Objective: To accelerate natural microbial degradation of oil by using a form of bioremediation that adds high numbers of oil-degrading microorganisms.

Description: Formulations containing specific hydrocarbon-degrading microbes are added to the oiled area because indigenous hydrocarbon degraders are low in number, or, those that are present cannot degrade the oil effectively. Since microbes require nitrogen and phosphorus to convert hydrocarbons to biomass, formulations containing these oil degraders must also contain adequate nutrients. Research studies conducted with bioengineered organisms or organisms enriched from different environments, grown in the laboratory to high numbers, and applied to an oiled beach to stimulate rapid biodegradation, have failed to prove conclusively that seeding is effective.

Bioaugmentation appears less effective than biostimulation because: 1) hydrocarbon degraders are ubiquitous in nature and, when an oil spill occurs at a given site, the influx of oil will cause an immediate increased response in the hydrocarbon degrading populations; but, 2) if nutrients are in limited supply, the rate of oil biodegradation will be less than optimal; thus, 3) supplying nutrients will enhance the process initiated by the spill, but adding microorganisms will not, because they still lack the necessary nitrogen and phosphorus to support growth.

Applicable Habitat Types: There is insufficient information on impact or effectiveness of this method to make a judgment on applicable habitat.

When to Use: There is insufficient information on impact or effectiveness of this method to make a judgment on when to use it.

Biological Constraints: Avoid using products containing ammonia-based fertilizers at elevated concentrations because un-ionized ammonia is toxic to aquatic life. Nitrate is an equally good a nitrogen source, minus the toxicity. If the product containing nutrients is applied properly with adequate monitoring, eutrophication should not be a problem; but, toxicity tests should be evaluated carefully, as other chemicals in the product could be toxic to aquatic organisms.

Environmental Effects: Detrimental physical effects to shoreline from foot or vehicle traffic caused by workers applying bioaugmentation products (unless nutrients are sprayed from a vessel or aircraft).

Waste Generation: None.

3230.121 In-Situ Burning

Objective: To remove oil from the water surface or habitat by burning it in place.

Description: Oil floating on the water surface is collected into slicks at least 2-3 mm thick and ignited. The oil can be contained in fire-resistant booms, or by natural barriers such as ice or the shore. On land, oil can be burned when it is on a combustible substrate such as vegetation, logs, and other debris. Oil can be burned from non-flammable substrates using a burn promoter. On sedimentary substrates, it may be necessary to dig trenches for oil to accumulate in pools to a thickness that will sustain burning. Heavy oils are hard to ignite but can sustain a burn. Emulsified oils may not ignite nor sustain a burn when the water content is greater than 30 to 50 percent.

When to Use: On most habitats except dry muddy substrates where heat may impact the biological productivity of the habitat. May increase oil penetration into permeable substrates. Use in marshes should be undertaken using special precautions. Not suitable for woody vegetation such as mangroves and hardwood swamps.

Applicable Habitat Types: On land, where there is heavy oil in sites neither amenable nor accessible to physical removal and it is important to remove the stranded oil quickly. In wetlands and mud habitats, a water layer will minimize impacts to sediments and roots. Many potential applications for spills in ice. There are many operational and public health limitations.

Biological Constraints: The possible effect of smoke on wildlife and populated areas should be evaluated.

Environmental Effects: Temperature and air quality effects are likely to be localized and short-lived. Toxicological impact from burn residues has not been evaluated. On-water, burn residues are likely to sink. On land, removal of residues is often necessary for crude and heavy oils. Limited data on burning oiled wetlands indicate recovery of wetland vegetation will depend on season of burn, type of vegetation, and water level in the marsh at time of burn.

Waste Generation: Any residues remaining after burning will need to be collected and land filled, but with an efficient burn will be a small fraction of the original oil volume.

Note: Any in-situ burning must be requested/vetted through the Region 9 Regional Response Team.

3230.122 Coastal Inlets

The coastal inlets of California are the focal points for designing strategies to protect the vital resources of the State's estuaries and bays. It is through these inlets that oil spilled on open ocean waters could reach inland resources. A publication titled Coastal Inlet Protection Strategies for Oil-Spill Response was prepared jointly by Miles O. Hayes and Todd M. Montello. This document provides a synopsis of the relevant characteristics of the coastal inlets in the State, as well as a discussion of potential protection strategies for each inlet. The discussion of each inlet alludes to the range of conditions that might occur at the inlet; however, the proposed protection strategies are based on the best professional judgment of what would work under average wave and tide conditions.

3230.123 Cleanup Counter Measure Matrices -see theTables below

Table 44. GASOLINE PRODUCTS (Category I): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats.

This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	A	A	A	A	A	A	A	A	A
Barriers/Berms	–	–	–	B	C	–	–	B	–	–	B	B
Manual Oil Removal/Cleaning	–	–	–	D	D	D	–	–	–	–	–	D
Mechanical Oil Removal	–	–	–	D	D	D	–	–	–	–	–	D
Sorbents	–	–	–	–	–	–	–	–	A	–	–	–
Vacuum	–	–	–	–	–	–	–	–	–	–	–	–
Debris Removal	–	–	–	–	–	–	–	–	–	–	–	–
Sediment Reworking/Tilling	–	–	–	D	D	D	–	–	–	–	–	D
Vegetation Cutting/Removal	–	–	–	–	–	–	–	–	–	–	–	D
Flooding (deluge)	–	–	–	A	A	A	A	–	–	–	–	B
Low-pressure, Ambient Water Flushing	–	–	–	B	B	A	A	–	–	–	–	B
High-pressure, Ambient Water Flushing	–	–	–	–	–	–	A	–	–	–	–	–
Low-pressure, Hot Water Flushing	–	–	–	–	–	–	–	–	–	–	–	–
High-pressure, Hot Water Flushing	–	–	–	–	–	–	–	–	–	–	–	–
Steam Cleaning	–	–	–	–	–	–	–	–	–	–	–	–
Sand Blasting	–	–	–	–	–	–	–	–	–	–	–	–
Solidifiers	–	–	–	–	–	–	–	–	–	–	–	–
Shoreline Cleaning Agents	–	–	–	–	–	–	–	–	–	–	–	–
Nutrient Enrichment	–	–	–	–	–	–	–	–	–	–	–	–
Natural Microbe Seeding	–	–	–	–	–	–	–	–	–	–	–	–
***In-situ* Burning**	–	–	–	–	–	–	–	–	–	–	–	–

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:
A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

Table 45. DIESEL-LIKE PRODUCTS AND LIGHT CRUDE OILS (Category II): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats.

This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	B	B	A	A	A	A	A	A	A
Barriers/Berms	–	–	–	B	C	B	–	B	–	–	B	B
Manual Oil Removal/Cleaning	–	–	B	B	C	C	A	C	C	B	D	D
Mechanical Oil Removal	–	–	–	B	C	D	–	D	–	–	–	D
Sorbents	B	B	B	B	A	A	A	A	A	A	A	A
Vacuum	A	–	A	–	–	–	–	C	B	–	C	B
Debris Removal	A	–	A	A	A	A	A	B	A	A	B	B
Sediment Reworking/Tilling	–	–	–	B	B	B	–	–	–	–	–	D
Vegetation Cutting/Removal	–	–	–	C	C	–	–	D	–	–	–	D
Flooding (deluge)	–	–	A	A	A	A	A	A	A	–	B	B
Low-pressure, Ambient Water Flushing	–	–	A	B	A	A	A	B	A	A	C	B
High-pressure, Ambient Water Flushing	–	–	B	–	–	–	A	–	C	B	–	–
Low-pressure, Hot Water Flushing	–	–	D	–	–	–	C	–	–	–	–	–
High-pressure, Hot Water Flushing	–	–	D	–	–	–	C	–	–	–	–	–
Steam Cleaning	–	–	–	–	–	–	–	–	–	–	–	–
Sand Blasting	–	–	–	–	–	–	–	–	–	–	–	–
Solidifiers	–	–	C	–	–	–	B	C	C	–	C	C
Shoreline Cleaning Agents	–	–	–	–	–	–	–	–	–	–	–	–
Nutrient Enrichment	–	–	–	A	A	A	A	I	A	I	I	A
Natural Microbe Seeding	–	–	I	I	I	I	I	I	I	I	I	I
***In-situ* Burning**	–	–	D	–	–	–	–	–	D	–	–	B

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:

A = May cause the least adverse habitat impact.

B = May cause some adverse habitat impact.

C = May cause significant adverse habitat impact.

D = May cause the most adverse habitat impact.

I = Insufficient Information - impact or effectiveness of the method could not be evaluated.

— = Not applicable.

Table 46. MEDIUM GRADE CRUDE OILS AND INTERMEDIATE PRODUCTS (Category III): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats.

This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	B	B	B	B	A	B	B	B	B
Barriers/Berms	–	–	–	B	C	B	–	B	–	–	B	B
Manual Oil Removal/Cleaning	B	B	B	A	B	B	A	B	B	B	C	C
Mechanical Oil Removal	–	–	–	B	B	C	B	D	–	–	–	D
Sorbents	A	A	A	A	A	A	A	A	B	A	A	A
Vacuum	A	–	A	B	B	B	A	B	B	–	B	B
Debris Removal	A	–	A	A	A	A	A	B	A	A	B	B
Sediment Reworking/Tilling	–	–	–	B	B	B	–	C	–	–	–	D
Vegetation Cutting/Removal	–	–	–	C	C	–	–	D	D	–	D	C
Flooding (deluge)	–	–	A	A	B	B	B	A	A	–	B	B
Low-pressure, Ambient Water Flushing			A	B	A	A	B	B	A	B	C	B
High-pressure, Ambient Water Flushing			B	–	C	B	B	–	B	B	–	–
Low-pressure, Hot Water Flushing			C	C	C	C	C	–	D	C	–	–
High-pressure, Hot Water Flushing			C	–	D	C	C	–	D	C	–	–
Steam Cleaning	D	D	D	–	D	D	D	–	D	D	–	–
Sand Blasting	D	D	D	–	–	–	D	–	D	D	–	–
Solidifiers	–	–	C	B	B	B	B	C	C	–	C	C
Shoreline Cleaning Agents	C	B	C	C	C	B	B	–	B	B	–	B
Nutrient Enrichment	–	–	–	A	A	A	A	I	B	I	I	B
Natural Microbe Seeding	–	–	I	I	I	I	I	I	I	I	I	I
***In-situ* Burning**	–	–	D	C	C	C	D	–	C	–	–	B

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:
A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

Table 47.HEAVY CRUDE OILS AND RESIDUAL PRODUCTS (Category IV): Relative environmental impact from response methods

This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	C	C	B	B	A	B	B	B	B
Barriers/Berms	–	–	–	B	B	B	–	B	–	–	B	B
Manual Oil Removal/Cleaning	–	–	B	A	A	B	A	B	C	B	C	C
Mechanical Oil Removal	–	–	–	B	B	C	C	D	–	–	–	D
Sorbents	A	A	A	A	B	B	B	B	C	B	B	A
Vacuum	A	–	A	A	B	B	A	B	B	–	B	B
Debris Removal	A	–	A	A	A	A	A	B	A	A	B	B
Sediment Reworking/Tilling	–	–	–	B	B	B	–	C	–	–	–	D
Vegetation Cutting/Removal	–	–	–	C	C	–	–	D	D	–	D	C
Flooding (deluge)	–	–	B	B	C	C	C	A	B	–	B	B
Low-pressure, Ambient Water Flushing	–	–	B	B	B	B	C	C	B	C	D	B
High-pressure, Ambient Water Flushing	–	–	B	–	D	B	B	–	B	C	–	–
Low-pressure, Hot Water Flushing	–	–	C	C	C	B	C	–	D	C	–	–
High-pressure, Hot Water Flushing	–	–	C	–	D	C	C	–	D	C	–	–
Steam Cleaning	D	D	D	–	D	D	D	–	D	D	–	–
Sand Blasting	D	D	D	–	–	–	D	–	D	D	–	–
Solidifiers	–	–	–	–	–	–	–	–	–	–	–	–
Shoreline Cleaning Agents	–	–	C	C	C	B	B	–	B	B	–	B
Nutrient Enrichment	–	–	–	B	B	B	B	I	C	I	I	B
Natural Microbe Seeding	–	–	I	I	I	I	I	I	I	I	I	I
***In-situ* Burning**	–	–	D	C	C	C	D	–	C	–	–	B

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type
A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

Table 48. NON-FLOATING OIL PRODUCTS (Category V): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats.
This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	D	C	B	B	A	B	B	B	B
Barriers/Berms	–	–	–	B	B	B	–	B	–	–	B	B
Manual Oil Removal/Cleaning	B	B	B	A	A	A	A	B	C	B	C	C
Mechanical Oil Removal	–	–	–	B	B	C	C	D	–	–	–	D
Sorbents	A	A	A	B	B	B	B	B	C	B	B	B
Vacuum	A	–	A	A	B	B	A	B	C	–	B	B
Debris Removal	A	–	A	A	A	A	A	B	A	A	B	B
Sediment Reworking/Tilling	–	–	–	B	B	B	–	C	–	–	–	D
Vegetation Cutting/Removal	–	–	–	C	C	–	–	D	D	–	D	C
Flooding (deluge)	–	–	B	C	C	C	C	B	C	–	C	B
Low-pressure, Ambient Water Flushing	–	–	B	C	C	C	C	C	C	C	D	B
High-pressure, Ambient Water Flushing	–	–	B	–	D	B	C	–	C	C	–	–
Low-pressure, Hot Water Flushing	–	–	C	C	C	B	C	–	D	C	–	–
High-pressure, Hot Water Flushing	–	–	C	–	D	C	C	–	D	C	–	–
Steam Cleaning	D	D	D	–	D	D	D	–	D	D	–	–
Sand Blasting	D	D	D	–	–	–	D	–	D	D	–	–
Solidifiers	–	–	–	–	–	–	–	–	–	–	–	–
Shoreline Cleaning Agents	C	B	C	C	C	B	B	–	B	B	–	I
Nutrient Enrichment	–	–	–	C	C	B	B	I	C	I	I	B
Natural Microbe Seeding	–	–	I	I	I	I	I	I	I	I	I	I
***In-situ* Burning**	–	–	–	C	C	C	–	–	C	–	–	C

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:
A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

3230.2 Pre-Beach Cleanup

3230.3 Storage

3240 Disposal

Refer to Sections 3008 and 4006 of the Region 9 Regional Contingency Plan.

3240.1 Waste Management and Temporary Storage Options

3240.11 Waste Management Strategies

One of the major problems associated with an oil spill response is the disposal of collected product and contaminated cleanup materials, soil, and debris. Each category of waste has it own type of response and management problem. The following discussion presents a general approach to the management of the various types of wastes collected during an oil spill. The flow chart following this section presents an encapsulated view of what types of waste are generated by an oil spill and the disposal options for each type.

3240.11.1 Disposal Options

Crude oil and refined Petroleum Products. Under California law, material released or discharged to marine waters of the state are defined as waste. Once the final disposition of a specific waste is determined, the waste may be redefined as a product or material and may no longer be subject to waste management requirements.

Crude oil spilled into marine waters, recovered, and transported to a refinery may be considered a product and may not be subject to hazardous waste management regulations [California Health and Safety Code (CHSC), 25943.2]. The collected crude oil may be shipped to the refinery of original destination or a refinery that can accept the spilled crude oil. Refined petroleum products that are recovered from marine waters may also be handled as a product if they can be used for their originally intended purpose (i.e. fuel, fuel oil, etc.)(CHSC 25250.3).

There are other avenues by which recovered petroleum may be managed as a material (CHSC 25143.2). These approaches include recycling the petroleum through incineration, as a fuel, a substitute for raw material feedstock, or as an ingredient used in the production of a product (i.e. asphalt). The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) should be consulted for more information on these and other management options.

State law requires the consideration of recycling, therefore recycling should be a top priority and will be undertaken if at all possible. The latest published list of companies who recycle oil, and the latest published list of licensed used oil haulers are presented in tables following this subsection. A discussion of waste minimization and recycling options is included in this subsection.

Recovered petroleum “products” that are not accepted by a refinery or that can not be recycled must be managed as a waste. In order that the appropriate management mechanism is determined for the recovered petroleum, the waste must be characterized by a state certified laboratory to determine if the waste is hazardous or non-hazardous. It is the responsibility of the Responsible Party (RP) to have the waste accurately characterized for proper disposition [Title 22, Sec. 66260.200(C) of the California Code of Regulations (22 CCR)].

Disposal at Sea of Water Separated from Recovered Oil. Oil recovered at sea typically contains significant amounts of seawater. In order to maintain the efficiency of the skimming process this water must be separated/decanted from the oil and discharged back to the ocean during recovery operations. Separated seawater typically contains elevated levels of hydrocarbons and thus the discharge of this material may constitute a discharge of a pollutant. The USCG On-Scene Commander recognizes the "discharge" of separated/decanted water as an integral part of offshore skimming operations and as an excellent waste minimization tool. Therefore, the USCG OSC or his/her representative may authorize the discharge of separated/ decanted water back into the catenary area of a boom/skimming system outside of State waters (3 miles). The exception to this will be in NOAA Marine Sanctuary waters.

With the addition of the Monterey Bay National Marine Sanctuary a significant portion of the coastline is now part of the National Marine Sanctuary program. Other sanctuaries include Point Reyes/Farallon Island, Channel Islands San Miguel, Santa Cruz, Santa Rosa, Anacapa, Santa Barbara Island, Richardson and Castle Rock), and Cordel Banks. Federal law prohibits the discharge of material, such as separated water, to marine sanctuaries unless permitted by the Administrator of the sanctuary program. Negotiations are presently under way seeking pre-approval to discharge separated waters during an emergency response to oil spills within the sanctuaries. Until pre-approval is obtained, a permit for the discharge of separated water must be obtained from the Assistant Administrator of the Sanctuary Program (202-606-4122) before any discharge can take place.

Contaminated Debris. Contaminated debris, including organic material, contaminated cleanup equipment (i.e. booms, pompoms, sorbents, etc.) and other contaminated materials that cannot be recycled must be managed as a waste. The materials must also be characterized before the appropriate waste management option is determined.

Oiled Animal Carcasses. Oiled animals and carcasses should be collected and turned over to the California Department of Fish and Game, Office of Spill Prevention and Response (OSPR) representatives who are responsible for wildlife rehabilitation and collection of carcasses for natural resource damage assessment (NRDA) investigations. The identification and location of OSPR representatives can be provided by the Unified Command Center. OSPR will be responsible for the disposal of the oil-contaminated carcasses.

3240.11.2 Waste Minimization and Recycling Opportunities

Debris Avoidance. It is generally not possible to avoid the generation of oily debris resulting from the contact of floating oil with waterborne solids, however, it is possible to minimize the generation of oily debris in the coastal intertidal zone if the anticipated area of oil impact can be cleaned prior to stranding of the spilled oil. This has been successfully accomplished in a small number of past spills (W. Schumaker, personal communication).

Personnel can be deployed to remove debris from beach intertidal areas above the high tide line in order to minimize oiling of stranded debris/trash. It is important to note that such crews are not likely to be certified as required under OSHA 1910.120 and can only perform this task prior to the stranding of spilled oil. A safety/industrial hygiene specialist (see 9334) should be consulted regarding the limitations of these crews and the effective establishment of exclusion zones in the area of beach impact.

Selection of Personal Protective Equipment. Depending upon climatic conditions and material compatibilities of personal protective equipment (PPE), waste can be minimized through the selection of reusable equipment, when possible. For instance, heavy gloves and boots that can be effectively decontaminated and reused can minimize the generation of oil-contaminated disposable gloves and boots, as long as the site safety officer approves such equipment use. Reusable rain gear may also be used instead of disposable suits, if approved. Such decisions should be made early in the response process in order to minimize generating containerized, contaminated PPE which is generally disposed at Class I facilities.

Recovered Oil and Oily-water. In order to maximize skimmer efficiency and effectiveness, water should be decanted to the spill impact area with the approval of the federal OSC and relevant state agency representatives. Operational standards (e.g., decanting only in the impact area where water depth is sufficient, no free oil) should be established as soon as skimming is initiated. In federal waters, decanting can be approved through a request to the federal OSC. As discussed earlier, in state waters approval must be secured from the Regional Water Quality Control Board.

Both oil and oily-water recovered from skimming operations should be off loaded to facilities where it can be effectively recycled/managed within established process and treatment streams. Such facilities would include terminals, refineries and commercial refiners/reclaimers/recyclers. These facilities can often provide temporary tank storage, when necessary. Oiled debris that is recovered with skimmed oil should be maintained in secure, temporary storage until it is sufficiently characterized for disposal.

Sorbent Use/Reuse. Synthetic sorbents (i.e., pads, sweeps, and booms) have become standard response materials in the “mechanical recovery” of spilled oil. Their oleophilic, hydrophobic character makes them efficient at separating oil and water and they are routinely used to recover oil from solid surfaces as well (e.g., rubble, cobble and boulder shorelines; equipment/gear; vessels; etc.). Since oiled sorbent material often constitutes a substantial percentage of the oily solid waste generated during spill response and cleanup, opportunities for minimizing this waste volume should be considered.

Some sorbents are designed to be reusable (i.e., mechanized rope-mop skimmers) or can be recycled onsite with inexpensive gear (e.g., appropriate barrel-mounted wringers). Sorbent manufacturer's instructions should be followed regarding the limits of effective reuse for their individual products. It is also possible to replace sorbent sweeps and booms with recyclable boom and other appropriate gear in circumstances where floating oil can be efficiently recovered without generating oiled sorbents. For example, in good-access, low energy shoreline areas (harbors, bays, inlets), it may be possible to use containment-boom and recover the trapped oil with vacuum trucks instead of contaminating large volumes of sorbent.

Petroleum-contaminated Spill Recycling and Reuse. While the volume of petroleum-contaminated soil associated with coastal spills is generally lower than such volumes resulting from large inland spills, opportunities for recycling/reuse should be considered. For soils satisfying the waste profiling requirements of the state and commercial facilities, beneficial reuse as daily landfill cover after appropriate treatment is an available option in California (see Response Resources lists). Recycling of oil-contaminated soil as aggregate in cold-mix and hot batch asphalt is available at four facilities in the State of Washington (Nash, et. al, 1992).

Furthermore, a recently completed study of the incorporation of oily/solid residuals into construction materials concluded that a large market exists in California and that these recycling/reuse opportunities should be pursued and encouraged (Mittelhauser Corporation, 1992). It is important to note that both the costs and benefits of such recycling (less than $100/ton and low future liability) versus disposal in a California Class I or II disposal facility (greater than $100/ton and moderate to high future liability) are substantial. Removal of contaminated soil from temporary storage will require the authorization of the On-Scene Coordinator.

3240.11.3 Temporary Storage

To expedite removal of spilled oil, refined products, and contaminated material from marine waters during an emergency response, temporary storage sites may be erected at appropriate shore locations [22 CCR 66270.1(c)3]. The transportation of oil and contaminated material to temporary storage sites during the emergency response is exempt from handling and permitting requirements [22 CCR 66263.30 and/or 66263.43]. The on-site California Environmental Protection Agency, Department of Toxic Substance Control (DTSC) representative or duty officer [(916) 445-3846] should be contacted for approval. If a Unified Command is established, OSPR will facilitate the contact with DTSC through their liaison function.

Temporary storage sites should be available at an onshore location convenient to the recovery operations to temporarily store recovered petroleum products and contaminated materials and debris. A temporary storage site may require a permit from the California Coastal Commission (CCC). For information on temporary permits within the coastal zone, contact the Energy and Resources unit of the CCC at (415) 904-5200.

Siting of the temporary facility must be done with the concurrence of the USCG and state OSC, DTSC, the local Regional Water Quality Control Board (RWQCB), and the local health, fire and emergency services departments. If a Unified Command is established, OSPR will facilitate the contact of the state and local government agencies through their liaison function.

Temporary storage facilities can include Baker tanks, tank trucks, oil drums, or empty fuel storage tanks. If suitable containers are not available, oily wastes may be temporarily stored in pits dug in the soil. These pits must be lined with plastic sheeting to prevent oil leakage and soil penetration.

3240.11.4 Initial Treatment

Petroleum and petroleum contaminated cleanup materials can potentially be treated at a temporary storage site. One of the treatment processes that may be used is Transportable Treatment Units (TTU). The most likely treatment process undertaken with a TTU will be separation of seawater from collected petroleum. Another method employed for separating water is decanting water from temporary storage tanks.

Any water generated through the separation of petroleum and seawater may be potentially discharged to a sanitary sewer system or back to marine waters. The sanitary sewer discharge will require a permit from the local sanitation district that will establish effluent requirements for the discharged water. Should a sanitation district not allow the discharge of water to its system, the recovered sea water would either be discharged back to the adjacent marine waters or transported off-site for disposal. The discharge of recovered seawater to state waters will require a NPDES permit from the local RWQCB.

A portable incinerator may be another type of TTU available during a spill response for use with contaminated material. The use of an incinerator will require a permit from the local air quality agency. The potential use of any TTU and regulatory standards must be discussed with DTSC.

3240.11.5 Characterization of Recovered Material

Recovered petroleum and contaminated debris not recycled must be characterized to determine their waste classification before the waste can be shipped to a proper waste management facility for final disposal. A State of California certified laboratory may conduct the actual testing on representative samples of each type of waste.

It is the responsibility of the generator/RP to have petroleum and contaminated material managed as waste accurately classified as hazardous or non-hazardous for proper disposition [22 CCR 66260.200(c)]. A generator who incorrectly determines and manages a hazardous waste as non-hazardous is in violation of the hazardous waste requirements and may be subject to DTSC enforcement action.

22 CCR 66264.13 and 66265.13 states that before an owner or operator of a treatment, storage, or disposal facility transfers, treats or disposes of any hazardous waste, the owner or operator shall obtain a detailed chemical and physical analysis of a representative sample of the waste. Characterization of the waste must be provided to DTSC (via profile sheet). The DTSC then designates the waste acceptable prior to shipment. State criteria for characterizing a waste hazardous or non-hazardous is found in 22 CCR 66261.10 and 66261.20-66261.24 while federal criteria is presented in 40 CFR 261.30-261.33. These criteria can apply to any oily-water; sorbents, booms, and debris generated as a result of oil spill cleanup. Based on waste characterization, the wastes can be further defined as either a Federal Resource Conservation and Recovery Act (RCRA) waste (hazardous waste regulated under federal regulations), non-RCRA waste (hazardous waste regulated under California regulations), or non-hazardous waste. Non-hazardous waste in this instance is defined as designated waste per 23 CCR 25522. Once the waste is characterized, disposition options can then be selected. Removal of recovered material from temporary storage will require the authorization of the OSC.

3240.11.6 Transportation

Recovered petroleum product not accepted at a refinery or recycling facility and contaminated material must be transported to an approved waste management facility. The type of waste management facility will be based on the results of the waste characterization performed.

Hazardous Waste. Waste classified as hazardous under either federal or state regulations must be transported to a permitted or interim status hazardous waste facility. A state licensed hazardous materials hauler must do hauling of the waste. The licensed hauler must have an U.S. EPA I.D. number and State transporter I.D. number. Prior to removal of the hazardous material from temporary storage, a uniform hazardous waste manifest (form DHS-8022A) must be prepared by the generator (RP or his representative) for recovered petroleum and other contaminated materials (22 CCR 66263.20 - 66263.23). If assistance is required for manifesting, the RP may request it from the on-scene DTSC representative or the state DTSC duty officer (916-445-3846).

All hazardous materials shipped off-site must be transported in compliance with applicable regulations. These include the RCRA regulations in 40 CFR 262-263, DOT Hazardous Materials Regulations (49 CFR 171-178), and any applicable state regulations (22 CCR 6626.20-6626.23).

Non-hazardous Waste. Waste determined to be non-hazardous but designated waste (23 CCR 2522) will be transported to a Class II waste management facility. Manifesting of the waste is not required but a Bill of Lading is required for transportation. The appropriate Regional Water Quality Control Board and local health department should be contacted to determine what waste management facility would accept the waste and any additional test requirements the facility might require. Removal of non-hazardous waste from temporary storage will require authorization of the OSC.

3240.12 Waste Management Facilities

There are three licensed hazardous waste management facilities in California. They are:

a. *Kettleman Hills Chemical Waste Management Co., Kettleman City (Kern County), California.*

Contact customer service at (559) 386-9711. They will provide name and number of local agent to contact for disposal information.

Only class I facility that accepts liquid waste in any sizable quantity. Liquid petroleum accepted at Kettleman Hills will be transported to their subsidiary in Azusa, California and further transported out-of-state for incineration.

b. *Clean Harbors, Westmorland (Imperial County), California.*

Contact customer service at (760) 344-9400 for information. This facility will accept only solid waste.

c. *Clean Harbors, Buttonwillow (Kern County), California.*

Contact customer service at (661) 762-6200. This facility accepts only solid waste although it is developing the ability to process small volumes of liquid waste.

Licensed Oil Recyclers in California		
Company Name	**Location**	**Phone Number**
D.K. Environmental	Los Angeles	(323) 268-5056
DeMenno/Erdoon	Compton	(310) 537-7100
Evergreen Oil, Inc.	Newark	(510) 795-7100
Hydra Fyne, Co.	City of Industry	(626) 369-6580
Industrial Service Oil Co.	Downey	(562) 598-5577
Leach Oil, Inc.	Compton	(310) 323-0226
Ramos Environmental	West Sacramento	(916) 371-5747
For more information on these companies, see California Environmental Protection Agency, Dept. of Toxic Substances Control Alternative Technology Division's DIRECTORY OF INDUSTRIAL RECYCLERS, 1991.		

Regional Water Quality Control Boards			
Region	**Location**	**City**	**Telephone Number**
Region 1	North Coast	Santa Rosa	(707) 576-2220
Region 2	San Francisco Bay	Oakland	(510)662-2300
Region 3	Central Coast	San Luis Obispo	(805) 549-3147
Region 4	Los Angeles	Monterey Park	(213) 576-6600
Region 5	Central Valley	Sacramento	(916) 255-3000
Region 8	Santa Ana	Riverside	(909) 782-4130
Region 9	San Diego	San Diego	(858) 467-2952

3240.12.1 Literature Cited

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3240.2 Decanting Policy - See MOU for State Waters - RCP Appendix VIII

3240.3 Sample Waste Management Plan - See RCP Appendix XXVII

3250 Decon

Refer to Section 3006 of the Region 9 Regional Contingency Plan.

3250.1 Sample Decon Plan

3260 Dispersants

Refer to Sections 4007.05 and 1007.05 of the Region 9 Regional Contingency Plan.

3260.1 Dispersant Options

3260.2 Dispersant Checklists

3260.3 Preauthorized Zones

3260.4 Dispersant Response Plan Worksheet

3260.5 SMART Protocol

3260.6 Types of Equipment Required

3270 ISB

Refer to Sections 4007.06 and 1007.06 of the Region 9 Regional Contingency Plan.

3270.1 ISB Options

3270.2 ISB Checklists

3270.3 Preauthorized Zones

3270.4 Types of Equipment Required

3280 Bioremediation

Refer to Section 1007.08 of the Region 9 Regional Contingency Plan.

***3300* Emergency Response**

Refer to Section 3003.01 of the Region 9 Regional Contingency Plan.

3310 SAR

Refer to Section 3003.01.1 of the Region 9 Regional Contingency Plan.

3310.1 SAR Area Sources

3320 Salvage/Source Control

Refer to Section 3003.01.2 of the Region 9 Regional Contingency Plan.

3320.1 Assessment and Survey

3320.2 Stabilization

3320.3 Specialized Salvage Operations

3320.4 Types of Equipment Required

3320.5 Salvage Guidelines

3330 Marine Fire Fighting

Refer to Section 3003.01.3 of the Region 9 Regional Contingency Plan and Section 8000.

3340 Hazmat

Refer to Section 3003.01.4 of the Region 9 Regional Contingency Plan.

3340.1 Initial Emergency Response Procedures

3340.2 Evacuation Procedures

3340.3 Hazmat POC's

3340.4 Types of Equipment Required

3350 EMS

Refer to Section 3003.01.5 of the Region 9 Regional Contingency Plan.

3350.1 Emergency Medical Services

3360 Law Enforcement

Refer to Section 3003.01.6 of the Region 9 Regional Contingency Plan.

3360.1 Perimeter/Crowd/Traffic/Beach Control

3360.2 Safety/Security Zones

3400 Air Ops

Refer to the Incident Management Handbook (IMH), COMDTPUB P3120.17.

3410 Air Tactical

Refer to the Incident Management Handbook (IMH), COMDTPUB P3120.17.

3410.1 Aerial Surveillance

3410.2 Aerial Dispersant Application

3410.3 Procedures for Temporary Flight Restrictions

3410.4 Permanent Area Restrictions

3420 Air Support

Refer to the Incident Management Handbook (IMH), COMDTPUB P3120.17

3420.1 Airports/Helibases

3420.2 Helospots

3420.3 List of Certified Helo's/Aircraft Providers

3420.4 Fuel/Maintenance Sources

3420.5 Air Traffic Control Procedures

3500 Staging Areas

3510 Pre-Identified Staging Areas

Refer to current Thomas Brothers Guide for locations.

The following locations have been identified as having potential to be utilized for the staging of equipment and personnel:

3510.1 Metropolitan Area

B Street Pier

Belmont Parking Lot

Dana Landing Parking Lot

Dog Beach Parking Lot

G Street Pier Harbor Island

La Jolla Cove Parking Lot

La Jolla Shores Parking Lot

Lifeguard Headquarters, Quivira Basin Parking Lot

Lifeguard Tower Parking Lot at Ventura (Mission Beach)

Lifeguard Tower Parking Lot on Abbott (Ocean Beach)

Marina Park Parking Lot (Behind the Convention Center)

NAS North Island

Ocean Beach Pier Parking Lot

Scripps Institute of Oceanography Parking Lot

South Mission Beach Jetty Parking Lot

Shelter Island Parking Lot

Tide Pool Parking Lots (Point Loma)

Vacation Isle Parking Lot (by Ingraham Street Boat Ramp)

3510.2 North County

Del Mar Fair Grounds

Oceanside Harbor Parking Lot

South Carlsbad State Beach Parking Lot

3510.3 South Bay

Border Field State Park

Silver Strand State Beach Parking Lot

Naval Amphibious Base Coronado

Naval Station

Naval Auxiliary Landing Field Imperial Beach

3520 Security

3600 dlife

Refer to Sections 3007 and 4008.01 of the Region 9 Regional Contingency Plan.

Following is an excerpt from the Wildlife Response Plan for California (Wildlife Plan). Refer to Section 3007 of the RCP and Appendix XXIIa for the complete version. The Wildlife Plan appendices are included in the RCP: Appendix XXIIb. The Wildlife Plan appendices can also be found in their entirety on the California Department of Fish and Game, Office of Spill Prevention and Response (OSPR) web site http://www.dfg.ca.gov/ospr/ .

Wildlife and habitats are put at risk or injured when oil is spilled into the marine environment. Both Federal and State statutes mandate protection, rescue and rehabilitation of oiled wildlife.

The Federal Spill Pollution Act of 1990 requires that a Fish and Wildlife and Sensitive Environments Plan be developed and include immediate and effective protection, rescue and rehabilitation of wildlife resources and habitat that are harmed by a spill.

The State of California's Lempert-Keene-Seastrand Oil Spill Prevention and Response Act requires:

- Development of contingency plans for the protection of fish and wildlife,
- Establishment of rescue and rehabilitation facilities,
- Establishment and funding of a network of rescue and rehabilitation facilities, known as the Oiled Wildlife Care Network,
- Assessment of injuries to natural resources from a spill,
- Development of restoration plans to compensate for adversely affected wildlife resources and habitats.

To address these statutory mandates, the Wildlife Plan has been developed by a group of federal and state agencies and other interested parties. The Wildlife Plan is part of the RCP/ACP for California, a joint document of U.S. Coast Guard (USCG) and OSPR.

The Wildlife Plan details the Wildlife Operations Branch purposes, goals, objectives, responsibilities, and structure. The Wildlife Operations Branch is in the Operations Section of the Incident Command System (ICS) for oil spill response. The Wildlife Operations Branch structure needed in California and detailed in this plan is expanded beyond that described in the USCG Incident Management Handbook at the Group level. As is always true with ICS, the structure may be expanded or contracted to fit the need, but the mission remains unchanged.

In California, the principal objectives of Wildlife Operations during a spill response are to:

- Protect wildlife and habitats from contamination,
- Minimize injuries to wildlife and habitats from the contamination,
- Minimize injuries to wildlife from the cleanup,
- Provide best achievable care for injured wildlife, and,
- Document adverse effects that result from the spill and cleanup.

To ensure these objectives are achieved with maximum efficiency, the Wildlife Branch Director coordinates and manages the activities of all personnel in the Wildlife Branch who fall under the authority of the Unified Command during spill response. These include federal, state, and local agencies along with commercial and non-profit organizations performing wildlife protection and management.

Within the Wildlife Operations Branch, there are four Groups who report to the Wildlife Branch Director:

- Wildlife Reconnaissance Group (aerial, ground, and on-water reconnaissance of wildlife in the spill area),
- Wildlife Hazing Group,
- Wildlife Recovery and Transportation Group (search and collection), and
- Wildlife Care and Processing Group (rehabilitation and logging in).

Even though Wildlife Operations is integrated into the ICS, it is self-directed in many ways and self-contained with regard to wildlife response resources (both staff and equipment). Wildlife Operations gathers much of its own spill information through wildlife reconnaissance, staffs its own Branch with pre-trained experts (e.g. veterinarians, rehabilitation staff, processing staff, capture experts, volunteers), and prepares its own sections of the Incident Action Plan for the Planning Section.

In this 2005 revision, the Wildlife Plan has been modified and expanded to ensure the statutory requirements of best achievable treatment, protection, and restoration of wildlife are met. This revision clarifies the organizational structure and details the required duties of the different positions within the Wildlife Operations Branch.

The Wildlife Plan has been written with the view that OSPR staff will usually assume the role of Wildlife Branch Director during a spill response. This is a natural consequence of the pivotal position of the Department of Fish and Game, because the Department:

- Is the lead state trustee agency for California's fish and wildlife,

- Has permits and agreements with other agencies, to care for special status species and other protected wildlife
- Has legal mandates to protect wildlife, beyond OPA 90 and OSPRA and,
- Has the needed expertise, training and experience

While the Wildlife Plan has been designed principally to cover oil spills in marine waters as required by Federal and State law, it is applicable to inland oil and non-oil spills as well. The organizational structure, roles and responsibilities remain the same, although some functions may be altered, as appropriate.

3610 Fish and Wildlife Protection Options

Refer to Sections 3007.01 and 4008.01 of the Region 9 Regional Contingency Plan.

3620 Wildlife Recovery

Refer to Appendix XXIIa of the Region 9 Regional Contingency Plan.

3620.1 Wildlife Recovery Operations/Procedures

Refer to Wildlife Response Plan for California, June 30, 2005. Appendix XXIIa

3620.2 Recovery Processing

3620.3 Carcass Retrieval and Processing

3630 Wildlife Rehab

Refer to Appendix XXIIa of the Region 9 Regional Contingency Plan.

3630.1 Wildlife Rehab Operations

3630.2 Rehab Facilities

3630.3 Rehab Procedures

3640 Essential Fish Habitat

3700 Reserved

3800 Reserved

3900 Reserved for Area/District